IEC 63203-801-2

Edition 1.0 2022-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Wearable electronic devices and technologies – Part 801-2: Smart body area network (SmartBAN) – Low complexity medium access control (MAC) for SmartBAN

Technologies et dispositifs électroniques prêts-à-porter – Partie 801-2: Smart body area network (SmartBAN) – Contrôle d'accès au support (MAC) à faible complexité pour SmartBAN



IEC 63203-801-2:2022-11(en-fr)



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 35.100.01; 35.240.80

ISBN 978-2-8322-6001-2

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES –

Part 801-2: Smart body area network (SmartBAN) – Low complexity medium access control (MAC) for SmartBAN

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The text of this International Standard is based on the following documents:

Draft	Report on voting
124/198/FDIS	124/206/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available

at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 63203 series, published under the general title *Wearable electronic devices and technologies*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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INTRODUCTION

TC 124 is developing International Standards (IS) for body area network (BAN) to define the wireless connectivity between the hub coordinator and the sensing nodes. The IEC 63203-801 series consists of the following sub-parts, under the general part title "Smart body area network (SmartBAN)":

IEC 63203-801-1: Enhanced ultra-low power physical layer

IEC 63203-801-2: Low complexity medium access control (MAC) for SmartBAN

The present document describes the medium access control (MAC) specifications including channel structure, MAC frame formats and MAC functions.

This document originates from the corresponding technical specification (ETSI TS 103 325) standardized in the European Telecommunication Standard Institute (ETSI) and captures the results the work of IEC TC 124 Working Group 4 on devices and systems. The current document reflects contributions and discussions by IEC TC 124 experts, mirror committees, liaison members and Joint Advisory Group (JAG) between IEC SyC. AAL, IEC TC 100 and IEC TC 124. This document contains material gathered from reports and group output from the IEC TC 124 meetings in May 2018 (Manchester), October 2018 (Busan), May 2019 (San Francisco), September 2019 (Shanghai), November 2020 (online) as well as information obtained during various web meetings.

Experts from the following national committees, liaison organizations have contributed: BE, CN, DE, FI, FR, GB, IN, JP, KR, MY, NL, US and ETSI TC SmartBAN.

This document is also positioned as a result of the activities of the JAG. At the IEC General Meeting in Busan in 2018, three committees related to wearable systems and technologies, SyC. AAL, IEC TC 100 and IEC TC 124 had a joint workshop and agreed to collaborate to develop relevant standards and to share roles. This collaboration agreement was advanced to a Joint Advisory Group (JAG) and the JAG was established managed by SyC. AAL in 2019.

The target audience for this document includes the following stakeholders who have an interest in the systems and services using wearable devices:

- consumer electronics (CE) and information communications technology (ICT) device manufacturers;
- system integrators who want to utilize wearable device and technologies;
- service operators who are interested in the AAL systems and services;
- stakeholders who want to understand the technologies and requirements for wireless connectivity between wearable sensor nodes and hub coordinators.

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES –

Part 801-2: Smart body area network (SmartBAN) – Low complexity medium access control (MAC) for SmartBAN

1 Scope

This part of IEC 63203-801 specifies low complexity medium access control (MAC) for SmartBAN.

As the use of wearables and connected body sensor devices grows rapidly in the Internet of Things (IoT), wireless body area networks (BANs) facilitate the sharing of data in smart environments such as smart homes, smart life, etc. In specific areas of digital healthcare, wireless connectivity between the edge computing device or hub coordinator and the sensing nodes requires a standardized communication interface and protocols.

The present document describes the following medium access control (MAC) specifications:

– channel structure;
– MAC frame formats;
– MAC functions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 63203-801-1:2022, *Wearable electronic devices and technologies – Part 801-1: Smart body area network (SmartBAN) – Enhanced ultra-low power physical layer*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
beacon
frame transmitted by a hub to facilitate network management, such as the coordination of medium access and power management of the nodes in the SmartBAN, and to facilitate clock synchronizationwith the hub

3.2
beacon period
duration during which a beacon is transmitted

3.3
downlink
communication link for transfer of management and data traffic from a hub to a node

3.4
hub
entity that possesses a node's functionality and coordinates the medium access and power management of the nodes in the SmartBAN

3.5
inactive period
period in time following an active transmission sequence during which the equipment does not transmit or receive

3.6
node
any entity conforming to the SmartBAN medium access control and physical interface to the wireless medium

3.7
priority channel access
highest priority access during multi-use channel access

3.8
re-use channel access
priority access during multi-use channel access which enables re-use of scheduled but non-utilised slots

3.9
scheduled access
one or more scheduled recurring time intervals that a node and a hub obtain using scheduled access to initiate frame transactions

Note 1 to entry: A scheduled allocation is an uplink allocation or a downlink allocation suitable for servicing high or low duty cycle periodic or quasi-periodic traffic on a committed schedule.

3.10
uplink
communication link for transfer of management and data traffic from a node to a hub

4 Abbreviated terms

ACK	Acknowledgement
BAN	Body area network
C-Ass	Connection assignment
C-Beacon	Control channel beacon
C-Frame	Control frame
CRC	Cyclic redundancy check
C-Req	Connection request
D/SR	Downlink/slot reassignment
D-Beacon	Data channel beacon
D-Frame	Data frame
D-Req	Disconnection request
D-Res	Disconnection response

EUI-48™	Extended Unique Identifier-48 bits
FCS	Frame check sequence
FEC	Forward error correction
IFS	Inter-frame spacing
IM	Information module
ISM	Industrial, scientific and medical
IU	Information unit
MAC	Medium access control
NACK	Negative acknowledgement
NID	Node ID
PHY	Physical layer
REP	Repetition coding
Rx	Receive
S-Ras	Slot reassignment
Tx	Transmit
UL	Uplink

5 General MAC framework

5.1 Different device types

Clause 5 provides the basic MAC framework for the nodes and hubs.

Two different device types can participate in SmartBAN:

1) sensor device (node); and
2) coordinator device (hub).

A hub is a device that acts as a SmartBAN coordinator. A node is any device that acts as an information source or an information sink. One hub and at least one node constitute a SmartBAN.

A SmartBAN shall be organized into a star topology illustrated in Figure 1. It shall consist of at least one node communicating directly with the hub.

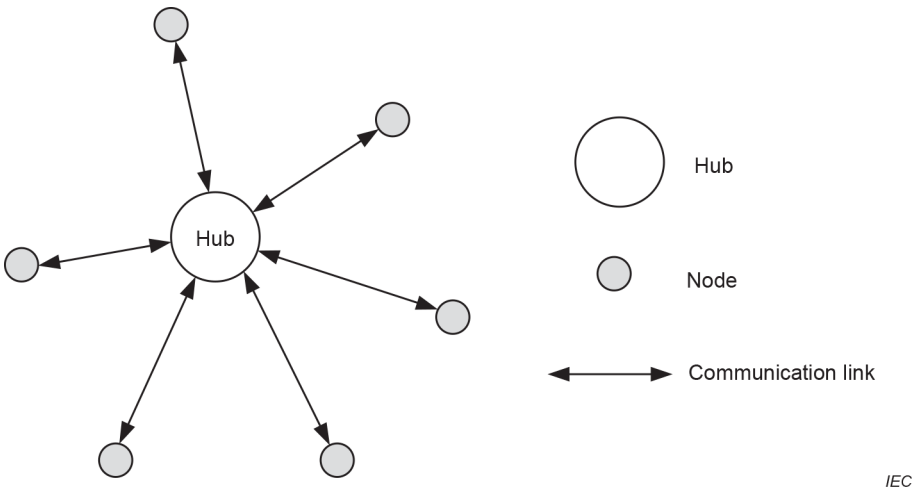


Figure 1 – SmartBAN topology